

## Test 4 Graphing and Solving Rationals PRACTICE Test

Period \_\_\_\_\_

**Simplify each expression.**

1)  $\frac{n^2 + 17n + 70}{n^2 + 5n - 14}$

2)  $\frac{2p + 16}{p + 10} \cdot \frac{1}{p^2 + 10p + 16}$

3)  $\frac{3x^2 + 13x + 4}{3x + 1} \cdot \frac{1}{x + 1}$

4)  $\frac{9n}{n^2 + 17n + 70} \div \frac{1}{n + 10}$

5)  $\frac{6y}{5x} + \frac{4}{3x}$

6)  $\frac{3v}{v + 6} + \frac{2v}{v - 4}$

**Identify the x-intercepts of each.**

7)  $f(x) = \frac{x^2 + 2x - 8}{-3x + 3}$

- A) X-intercepts: 2, -2
- B) X-intercepts: 1
- C) X-intercepts: 2, -4
- D) X-intercepts: None

**Identify the vertical asymptote(s).**

8)  $f(x) = \frac{-2x^2 + 8x - 6}{x^2 - x - 2}$

- A) Vertical Asym.:  $x = 3, x = 1$
- B) Vertical Asym.:  $x = 2, x = -1$
- C) Vertical Asym.:  $x = 1, x = -3$
- D) Vertical Asym.:  $x = -3$

**Determine where the function is undefined.**

9)  $\frac{b + 6}{b^2 + 8b + 12}$

- A) {10, -6}
- B) {-6, -2}
- C) {-6}
- D)  $\{-\frac{8}{7}\}$

**Identify the Domain.**

10)  $f(x) = \frac{3x^2 - 6x}{x^2 - 4}$

- A) Domain: All reals except 1, 2
- B) Domain: All reals except 0, 2
- C) Domain: All reals except -2, 2
- D) Domain: All reals except -2, 1

11) Describe the transformation of  $\frac{1}{x}$  to

$$\frac{1}{x-2} + 3$$

- A) Left 3, Down 2
- B) Left 2, Up 3
- C) Right 3, Down 2
- D) Right 2, Up 3

**Identify the horizontal asymptote of each.**

12)  $f(x) = \frac{1}{-4x + 4}$

- A) Horz. Asym.: None, it's slanted.
- B) Horz. Asym.:  $y = -\frac{1}{4}$
- C) Horz. Asym.:  $y = -4$
- D) Horz. Asym.:  $y = 0$

13)  $f(x) = \frac{-2x^2 - 4x}{x^2 - 3x}$

- A) Horz. Asym.: None, it's slanted.
- B) Horz. Asym.:  $y = 0$
- C) Horz. Asym.:  $y = -\frac{1}{2}$
- D) Horz. Asym.:  $y = -2$

14)  $f(x) = \frac{x^2 - x - 12}{3x}$

- A) Horz. Asym.: None, it's slanted.
- B) Horz. Asym.:  $y = -1$
- C) Horz. Asym.:  $y = -\frac{1}{3}$
- D) Horz. Asym.:  $y = 0$

15) Which of the following functions has a horizontal asymptote at  $y = 0$ ?

- A)  $f(x) = \frac{x^4 - 16}{x^4 - 1}$
- B)  $f(x) = \frac{x - 2}{x^2 + 5x - 4}$
- C)  $f(x) = \frac{x - 3}{x + 3}$
- D)  $f(x) = \frac{x^2 + x - 2}{x - 2}$

16) Which of the following functions has a slant asymptote when graphed?

- A)  $\frac{7}{x+1}$
- B)  $\frac{x+5}{x^2-9}$
- C)  $\frac{x^3+3}{3x-1}$
- D)  $\frac{2x+1}{x+3}$

**Match the Horizontal Asymptotes/End behavior to the given equations.**

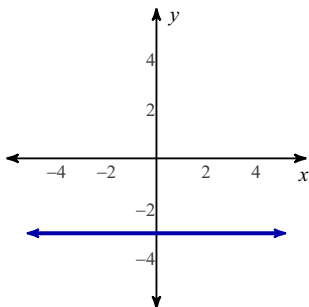
17)  $\frac{2x}{x}$

18.  $\frac{1}{x}$

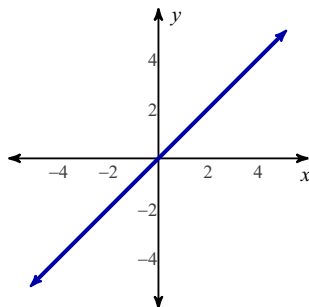
19.  $\frac{x^2}{x}$

20.  $-\frac{3x}{x}$

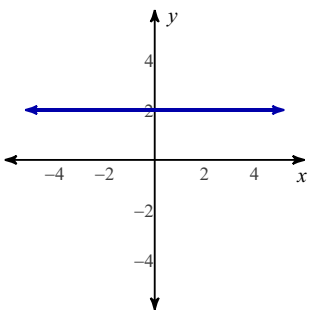
A)



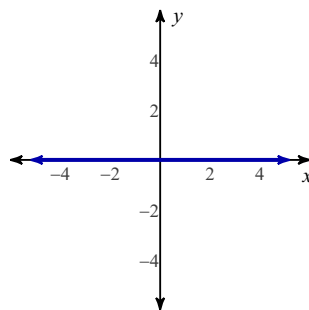
B)



C)



D)



**Match the following functions with the corresponding graph.**

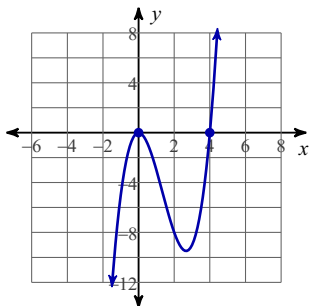
21.  $x(x+2)(x-4)$

22.  $(x+2)^2(x-4)$

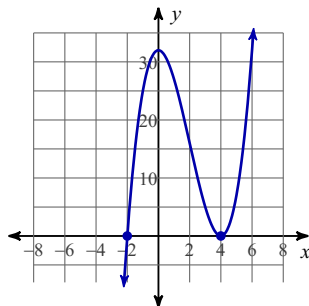
23.  $(x+2)(x-4)^2$

24.  $x^2(x-4)$

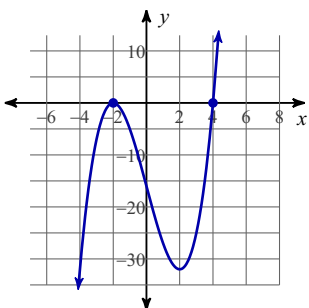
A)



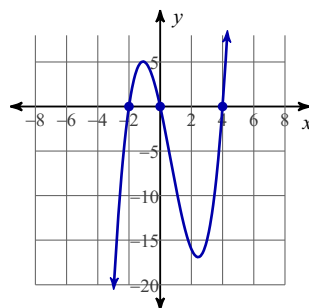
B)



C)



D)



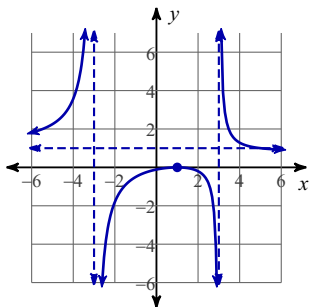
19) 25.  $\frac{1}{(x-3)(x+3)}$

26.  $\frac{2x+2}{(x-3)(x+3)}$

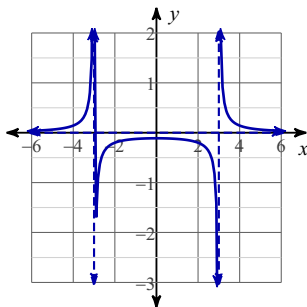
27.  $\frac{3x^2}{(x-3)(x+3)}$

28.  $\frac{(x-1)^2}{(x-3)(x+3)}$

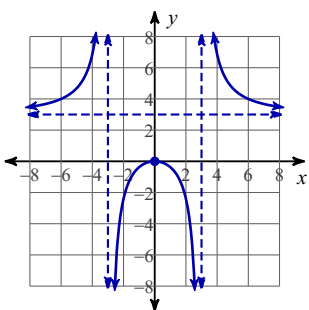
A)



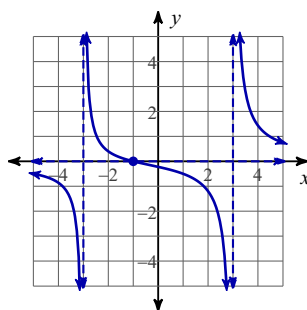
B)



C)



D)



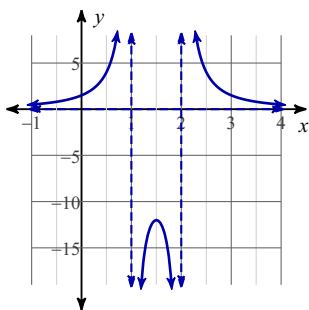
20) 29.  $\frac{2}{(x-1)^2(x+2)}$

30.  $\frac{x+2}{x^2+4x-5}$

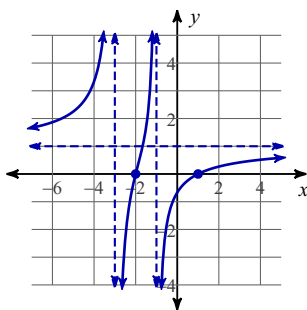
31.  $\frac{3}{x^2-3x+2}$

32.  $\frac{(x-1)(x+2)}{x^2+4x+3}$

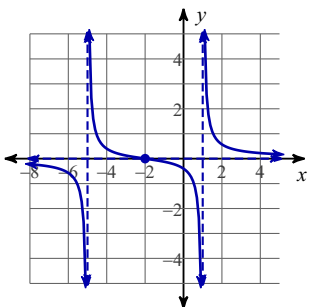
A)



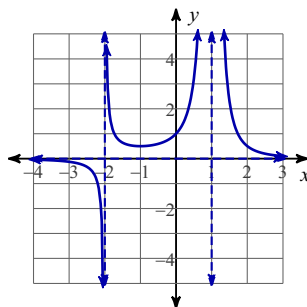
B)



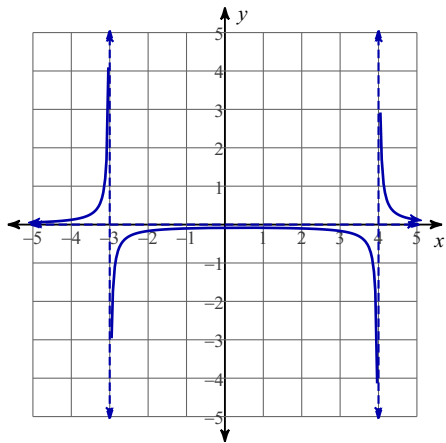
C)



D)



21)



Determine the features:  $\frac{1}{(x-4)(x+3)}$

X-intercept(s): \_\_\_\_\_

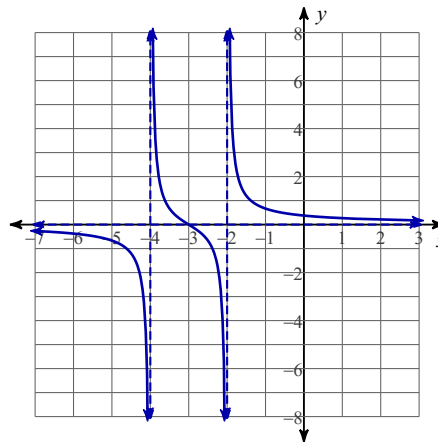
Vertical Asymp.: \_\_\_\_\_

End Behavior/Horiz. Asymp.: \_\_\_\_\_

Domain \_\_\_\_\_

Range \_\_\_\_\_

22)



Determine the features:  $\frac{x+3}{x^2+6x+8}$

X-intercept(s): \_\_\_\_\_

Vertical Asymp.: \_\_\_\_\_

End Behavior/Horiz. Asymp.: \_\_\_\_\_

Domain \_\_\_\_\_

Range \_\_\_\_\_

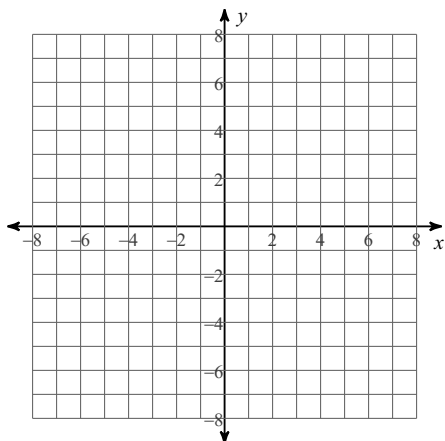
23) Determine the features and graph:

$$\frac{1}{(x-2)(x+2)}$$

X-intercept(s): \_\_\_\_\_

Vertical Asymp.: \_\_\_\_\_

End Behavior/Horiz. Asymp.: \_\_\_\_\_



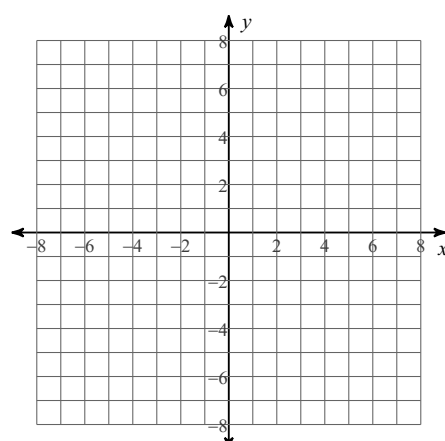
24) Determine the features and graph:

$$\frac{x+2}{x^2+4x+3}$$

X-intercept(s): \_\_\_\_\_

Vertical Asymp.: \_\_\_\_\_

End Behavior/Horiz. Asymp.: \_\_\_\_\_



**BONUS: Use long division to find the slant asymptote of the given equation:**

$$\frac{x^3 + 5x - 3x - 2}{x^2 + x}$$

25)

$$x^2 + x \sqrt{x^3 + 5x^2 - 3x - 2}$$

- A)  $y = x - 6$       B)  $y = x + 6$   
C)  $y = x - 4$       D)  $y = x + 4$